

DESCRIPTION

The unit NCUM10 is a safety device used to detect the uncontrolled movement of elevators in accordance with EN 81-20:2014, EN 81-50:2014. The operation of this module is based on the use of guided safety relay contacts.



SAFETY PRECAUTIONS



The inputs of the unit (C11-C12-S41-S42) must be safety contacts comply with paragraph 5.11.2 of the standards EN81-20:2014 and perform a function of personal protection; they should not be bypassed (by shorting the contacts), moved, removed or rendered ineffective by other means. Incorrect installation or manipulation can cause serious personal injury. The manufacturer or installer of the machine is responsible for the proper and safe operation.

The auxiliary output 31-32-33/61-62-63 provides a indication on the status of the device, so it must not be used in any way as a safety output.

The NCUM10 is not suitable for operation in the presence of ionizing and non ionizing radiation (X-rays, microwaves, lasers, ultraviolet rays).

The NCUM10 control unit must be assembled in a suitable operating area (switch cabinet, protective housing).

In the following cases you must use a IP54 cabinet:

- If the safety UCM outputs (13-14,23-24) have a voltage difference between them greater than 160V
- if outputs of the leveling safety output (43-44, 53-54) have a difference of voltage between them exceeding 160V

OPERATION

The safety unit NCUM10 integrates the unit for uncontrolled movement and a leveling control unit. It can be used in different way

Mode with independent leveling (Fig.1): in some application is needed to separate the elevator levelling from the UCM detector to avoid, in case of exit from leveling zone, that the controller put the elevator out of order.

In this case, the system needs to add to the NCUM10, also a control unit for the leveling (NC80,NC96LIFT) with an additional 2 contacts sensor.

The leveling unit output, in parallel with the safety door contact, make the optoisolated input C11 The magnet used to activate the double contacts sensor wired on the inputs S11-S12, S21-S22 must be positioned so that its activation will be longer then the activation of the leveling control unit sensors

If the input PS2 is connected before the car door contact, the NCUM will automatic restart closing its outputs (13-14/ 23-24) in case a safety contact before the door has been opened (it's not an unintended car movement) . If the power supply sense (PS2) is not used, **the door contact has to be wired at the beginning of the elevator safety circuit.**

Mode with or without leveling on the elevator safety circuit (Fig.2): the control unit NCUM10 integrated as well the leveling function as the uncontrolled movement function.

The safety door contact is wired in parallel with the outputs 53-54 in case it is needed the leveling with open doors, and it is connected to the optoisolated input C11 If the leveling is not necessary the outputs 43-44 must be wired on the input S41.

If the input PS2 is connected before the car door contact, the NCUM will automatic restart closing its outputs (13-14/ 23-24) in case a safety contact before the door has been opened (it's not an unintended car movement) . If the power supply sense (PS2) is not used, **the door contact has to be wired at the beginning of the elevator safety circuit.**

Mode independent inputs with Safety doors Stem IP67 (Fig.3): in this case the system is completely independent from the elevator safety circuit, in fact it is used the input S42 provided by a second safety door contact (mechanical or provided from the Stem IP67 Unit) while at the input S41 is connected the output 43-44 of the leveling unit. The 53-54 can be used as standard leveling output

The unit NCUM10 monitors the signal status of the inputs (C11-C12, S41-S41) and if a dangerous event happen, it will open the safety outputs 13-14/ 23-24 The unit NCUM10 allows the leveling operation with open doors. Monitoring inputs S11-S12 and S21-S22it will open the safety contacts 43-44/53-54 if the car moving out the doors zone(detail on the leveling operation in fig.7 and fig.8)

Start

As required by law, if a hazardous event occurs, the safety output will remain open until the operation by a skilled person will bring the system in safety conditions and send a signal to start contacts (S31-S32). If a temporary lack of power supply happen, the module will continue to work if it is connected to the battery.

If the elevator car is at the floor, the safety output (13-14, 23-24) remain closed instead, if the cabin is out the floor, the level unit is open and in cosequence also the safety outputs (13-14, 23-24) will be open.

The unit sense the presence of power supply, thanks the inputs PS1,PS2 and it will send an automatic start to close the outputs contact.

Hazardous event

Is considered an Hazardous event, a car movement with the doors open out of the door zone. Therefore the positioning of the magnet for the levelling must be due to guarantee the car stop within one meter in case of uncontrolled movement as indicated in the normative.

STOPPING DEVICES

The stopping elements usable with our device are: electrical brakes, solenoid lock to activate the overspeed governor, solenoid valves.

The stopping elements have to comply the EN81-20. If the switching current to energize the braking element is greater than 3A (6A in case of outputs 13-14/23-24 connected in parallel) appropriate contactors in accordance to the point 5.11.2 of the EN81-20, have to be installed between NCUM and the coil of the braking elements. The response time of the contactors have to be considered in the global system response time calculation.

STOPPING DEVICES MONITORING (Fig. 4-5-6)

The control unit manages the monitoring of two stopping devices: sending a test pulse to the inputs T1 and/or T2, the safety output contacts 13-14 and/or 23-24 will open activating the stopping devices (brakes, valves, solenoids lock on the overspeed governor). If they work properly, they will send a signal of successful implementation to R1 and R2 inputs and the NCUM01 will close again the safety outputs 13-14 and/or 23-24. The feedback signals on the OT outputs, allows to check the correct stopping device activation by the lift controller, while the impulse on the microswitch M1,M2 will check the correct functioning of them and they can be used to check the returning to the off position of the stopping devices. The periodical activation of the monitoring procedure using (T1 and/or T2 inputs) is in charge of the final user when required by EN81-20.

Microswitches M1 and M2 have to be positive opening contacts (P).

ASSEMBLY

Installation must be performed by authorized personnel only.

The unit is installed by clipping it to a standard 35 mm top-hat rail.

ELECTRICAL CONNECTION

Electrical connection must be performed by authorized personnel only.

All the electrical inputs must either be isolated from the mains supply by a separate coils safety transformer in accordance with EN IEC 61558-2-6 with limited output voltage in the event of a defect or by another equivalent movable mechanism.

Each safety relay output (13-14/23-24/43-44/53-54) has a maximum current of 3 A; the supply connected to the outputs must be protected from overcurrents by devices adequate to the loads that have to be protected.

All the output contacts must have an adequate protective circuit for capacitive and inductive loads. A fast-blow 500mA fuse must be connected to input A3 of the battery (+12 V).

If a common power supply is used, all the inductive and capacitive loads (e.g. relay contactors) connected to the power supply must be connected to appropriate interference suppressors.

SERVICE AND INSPECTION

The correct functioning of the NCUM10 safety unit must be controlled by the operator and/or by the control circuit of the elevator periodically by checking:

- correct switching function
- secure mounting of components
- correct connection fixing.

The monitoring function of the unit is done at every switching.

In the event of damage or wear and tear, the damaged system component must be replaced.

Liability coverage is void under the following circumstances:

- if instructions are not followed
- non-compliance with safety regulations
- installation and electrical connection not performed by authorized personnel
- non-implementation of functional checks.

SETUP

If the control unit does not appear to function when operating voltage is applied (green "Power" LED does not light up), the unit must be returned unopened to the manufacturer.

Check whether the safety outputs are being switched (see LED display) by activating the two inputs and START.

CONNECTORS PINS FUNCTIONALITY

C11	Safety circuit input AC/DC (voltage according to ordering code)
C12	Safety circuit voltage reference AC/DC
S42	Second door contact input
S41	Second levelling unit contact input
S11 - S12	Leveling unit first sensor input
S21 - S22	Leveling unit second sensor input
S12 - S33	Start / feedback leveling contact
S31 - S32	Start / feedback UCM contact
A1	Power supply module 24VDC positive / 24VAC
A2	Power supply module 24VDC negative / 24VAC
A3	Positive 12V battery power supply (connect 500 mA fast blow fuse)
A4	Negative 12V DC battery voltage
V+	UCM internal supply positive supply voltage
G	Internal voltage reference
PS1	Sense power supply pin1 AC/DC(Vmax Voltage safety circuit)
PS2	Sense power supply pin2 AC/DC(Vmax Voltage safety circuit)
T1	Test input 1 (opening 13-14, VMAX 30VDC)
T2	Test input 2 (opening 23-24, VMAX 30VDC)
CT	Common for test impulse (GND)
R1	Feedback contact from stopping device 1 (output 13-14, 0-10V)
R2	Feedback contact from stopping device2(output 23-24, 0-10V)
OT1	Feedback Test stopping device 1 (0-12V)
OT2	Feedback test stopping device 2 (0-12V)
13 - 14	UCM safety output1
23 - 24	UCM safety output2
31	Auxiliary output UCM: Common
32	Auxiliary output UCM: NC
33	Auxiliary output UCM: NO
43 - 44	Levelling unit safety output1
53 - 54	Levelling unit safety output2
61	Levelling auxiliary output: Common
62	Levelling auxiliary output: NC
63	Levelling auxiliary output: NO

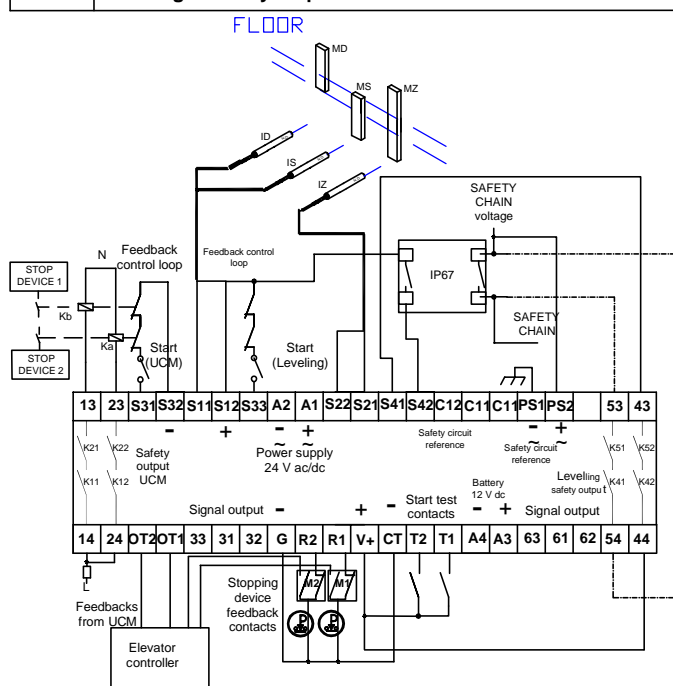


FIG. 3 Independent safety chain mode

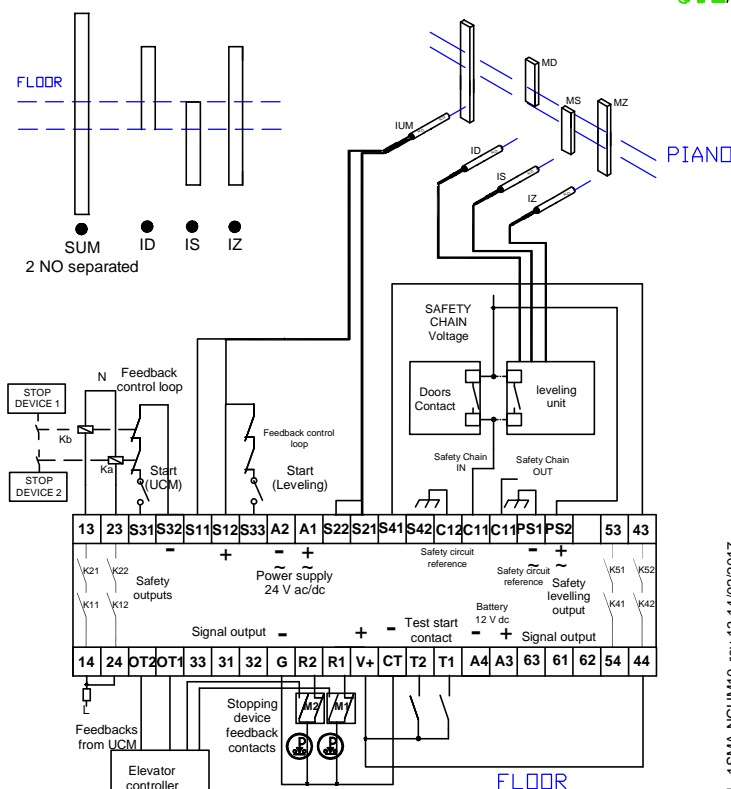


FIG. 1 Independent levelling mode

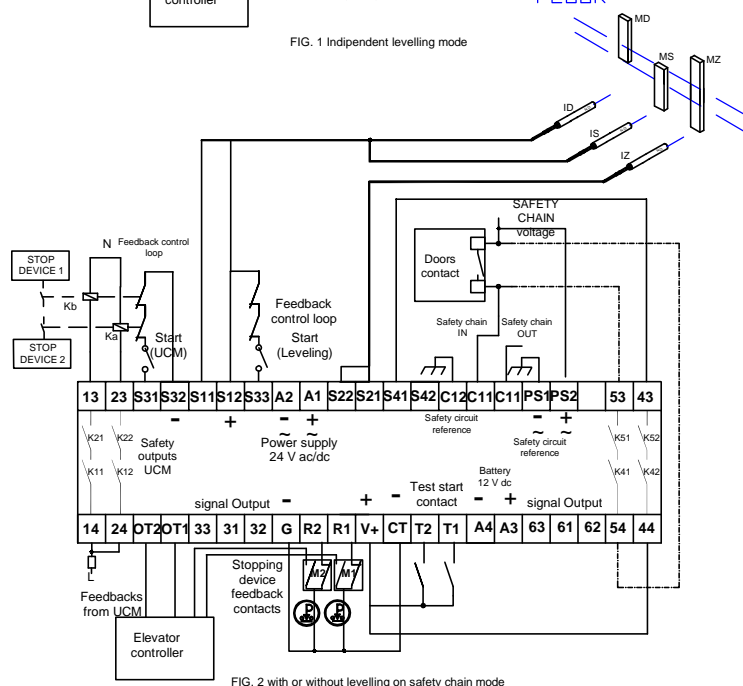


FIG. 2 with or without levelling on safety chain mode

LED Table

Function	LED	Colour	State
Power supply	PWR	Green	on
Second door contact*: CLOSED	CP	Green	on
Output 13-14 e 23-24: CLOSED	OUT	Green	on
** TEST: Running	T1, T2	Green	on
Levelling Sensor S1	S1	Green	on
Levelling Sensor S2	S2	Green	on
Output 43-44 e 53-54: CLOSED	OUTL	Green	on

* Second contact of a double door contacts or second output of the STEM IP67 safety door system. If the contacts S41 and S42 are both closed (+12 V), the CP LED remains off.

** LED OUT indicates the activation of the safety circuit; during the stopping device test, LED OUT remains ON even if output 13-14 and/or 23-24 opens.

Monitoring timing diagram

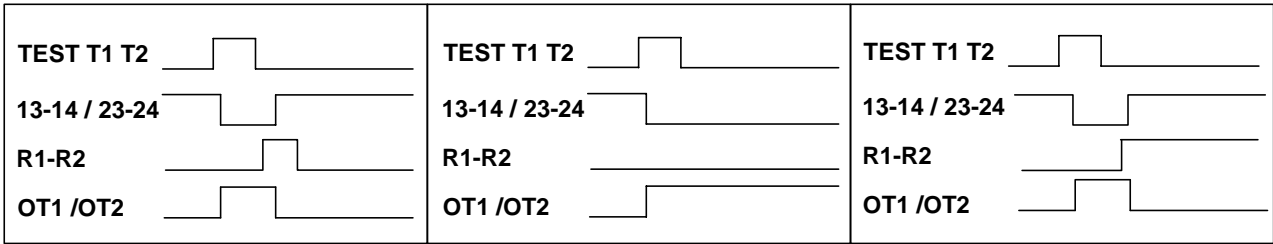


FIG. 4: TEST OK

FIG. 5: FAILED TEST
STOPPING DEVICE IS NOT WORKING SAFETY
OUTPUT REMAIN OPEN

FIG. 6: FAILED TEST
STOPPING DEVICE IS WORKING BUT MICROSWITCH IS BROKEN
OR STOPPING DEVICE
DOESN'T COME BACK TO THE OFF POSITION

Leveling unit functionality

The safety module NCUM10 has integrated a leveling unit and it is able to check the status of the contacts (S11-S12/S21-S22): the leveling output (43-44 /53-54) are activated if the sensors are in the correct position and if the start button S41 has been activated. The opening of even only one input contact (S11-S12/S21-S22) , leads to a safety situation, by putting the safety outputs (43-44 /53-54) in open state and by preventing the closing even after the re-closing of the contact and the pressure of the START button.

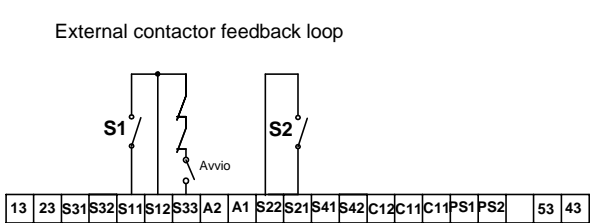
For the automatic start, please check the following scheme.

The responsibility to choose the adequate components for safety applications, for example guided contacts safety relays, falls to the user.

Leveling unit sensors positioning

Sensors and leveling unit have to comply EN81-20. The sensor targets (typically a magnet) have to be positioned in the door zone and their length have to be appropriate in order to guarantee the car stopping within 1m from the landing sill as required by EN81-20. The trimming of the target length (i.e. magnet) is in charge of the user in accordance to the response time of the stopping element and the elevator speed.

1) Manual leveling start



2) Automatic leveling start

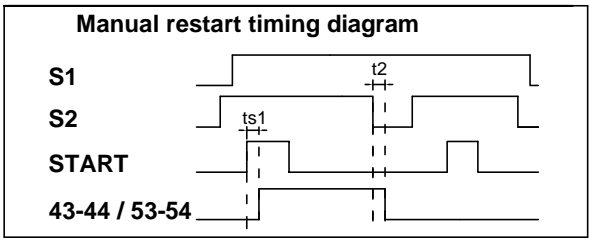
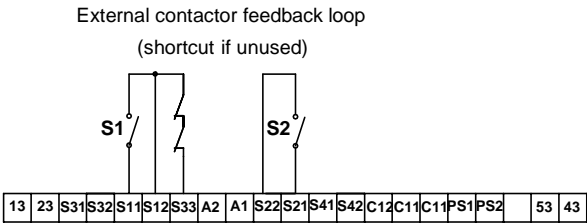


FIG. 7 Conections and timing diagram for manual restart

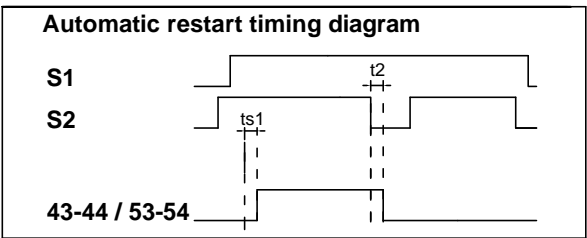


FIG. 8 Conections and timing diagram for automatic restart

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TECHNICAL DATA		
Parameter	Value	Unit
Housing material	PA	
Dimensions	160,5 x 96,8 x 62,5 (height)	mm
Weight	360	g
Operating conditions	Temperature: -5 ... +55	°C
	Relative humidity: 4% ... 100%	
	Pressure: 86 ... 106	kPa
Housing conditions	Temperature: -25 ... +70	°C
	Relative humidity: 5% ... 95%	
	Pressure: 86 ... 106	kPa
Degree of protection (IEC 60529)	IP20	
Pollution Degree (see note1)	3	
Overvoltage Category	III	
Assembly	35 mm DIN standard rail	
Connection type	Screw terminals	
Supply voltage	24 -15% / +10% (AC 50 ÷ 60 Hz)	V ac/dc
Battery supply voltage	12 -15% / +10%	V dc
Internal fuse on the supply	750 mA PTC fuse	
External fuse on battery input (A3, +12V)	500 mA fast action fuse	
Current consumption	@24Vdc: 80 min, 210 max; @24Vac: 190 min, 480 max	mA
Safety outputs switching voltage	240 (max) (Safety output)	V ac
Switching current AC-1 / Electrical life	3 A (Safety output) / >10 ⁵ cycles	A
Minimum switching current @ 10 V	10	mA
Safety output swiching power	720 (max)	VA
External fuse on outputs 13-14, 23-24, 43-44, 53-54	4 A gG (according to IEC EN 60269-1)	
Uncontrolled movement safety output t contacts	13 -14 / 23-24	
Auxiliary uncontrolled movement safety output contacts	31 - 32 NC 31 - 33 NO	
Safety leveling output contacts	43 -44 / 53-54	
Auxiliary levelling output contacts	61 - 62 NC 61 - 63 NO	
Usage category / Electrical life (SAFETY outputs)	AC-15: 1,4 A / 240 V (inductive load, cos Φ=0,3)/10 cycles	
	DC-13: 1A / 24 V / 10 cycles	
Auxiliary outputs terminals	max: 0,5A @ 24 Vdc	
OFF state response time	20	ms
Max input sensor resistance	200	ohm
Vibration resistance	IEC 60068-2-6:2007, IEC 60068-2-27:2008 EN 81-20:2014, EN 81-50:2014	
Mechanical life	10 ⁷	cycles
EMC compliance	EN 12015, EN 12016	
In accordance with	EN 81-20:2014, EN 81-50:2014	
Approval	TÜV SUD EDES 009	

NOTE 1

Condition met if:

- The UCM safety outputs (13-14,23-24) in the final application have a voltage difference between them of less than 160V
- The leveling of safety outputs (43-44, 53-54) have a voltage difference between them of less than 160V

SAFETY CIRCUIT VOLTAGE	ORDERING CODE
24V	NCUM10000024
48V	NCUM10000048
60V	NCUM10000060
110V	NCUM10000110
220V	NCUM10000220



ELECTRICAL DRAWINGS FOR ELECTROMAGNET APPLICATION TO ACTIVATE THE OSG

To use of NCUM10 for OSG application, we suggest the connection diagram in fig. 9 When the temporary voltage dip or the accidental opening of the safety circuits happens, the use of a second door contact allows to avoid the opening of the safety output 13-14/23-24 and then the activation of the safety gear.

The elevator system has to be equipped with an additional car door contact or it needs the door safety system STEM IP67.

Alternatively, to the second car door contact:

- the whole safety circuit could be placed under battery
- or a capacitor can be added at the beginning of the safety circuit, before each safety contacts, to have a delay in the OSG activation in case of main power supply failure

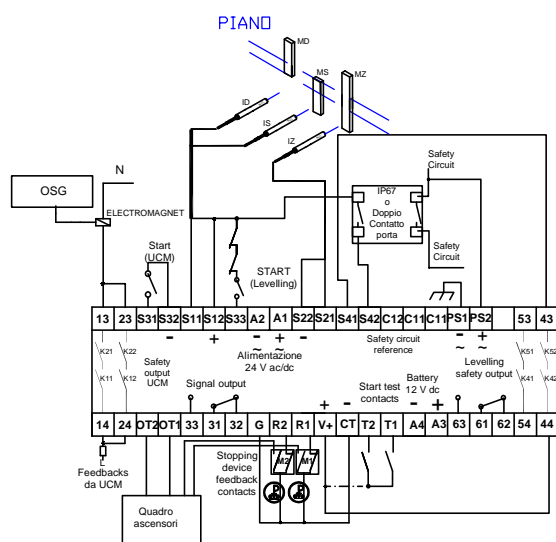


FIG. 9 Connections for OSG application

PROCEDURE FOR VALVES MONITORING FOR HYDRAULIC LIFT

VALVE TEST V1

- 1) Stop the elevator at a designed floor
- 2) Checks that the door are closed
- 3) Send an impulse to the input T1
- 4) The safety output 13-14 will open and valve V1 will be closed
- 5) Open the valve V2
- 6) Wait a sufficient time to evaluate the possible oil leakage of the valve V1
- 7) Send a start signal to levelling unit (S12-S33)
- 8) If the elevator didn't move the NC (61-62) contact will open
- 9) If the NC contact (61-62) is open, the safety output 13-14 will be automatically closed, otherwise it will remain open and the elevator will be out of service
- 10) The monitoring of the OT1 and R1 signals allow to check the test result (fig.4-5-6)

VALVE TEST V2

- 1) Stop the elevator at a designed floor
- 2) Checks that the door are closed
- 3) Send an impulse to the input T2
- 4) The safety output 23-24 will open and valve V2 will be closed
- 5) Open the valve V1
- 6) Wait a sufficient time to evaluate the possible oil leakage of the valve V2
- 7) Send a start signal to levelling unit (S12-S33)
- 8) If the elevator didn't move the NC (61-62) will open
- 9) If the NC contact (61-62) is open, the safety output 23-24 will be automatically closed, otherwise it will remain open and the elevator will be out of service
- 10) The monitoring of the OT2 and R2 signals allow to check the test result (fig.4-5-6)

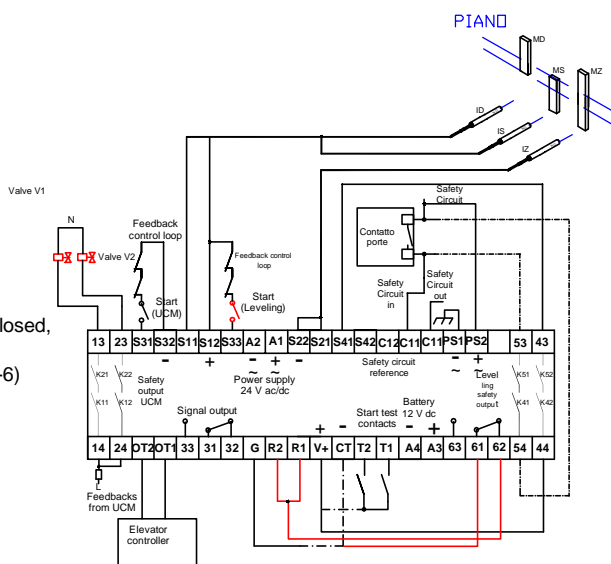


FIG. 7 Scheme for valves monitoring in a hydraulic elevator

ANNEX A

TESTING PROCEDURE ACCORDING TO EN81-50:2014

Testing procedure according to §5.8.3.2.4

- 1) Install all the appropriate out of serving signalling at each floor
- 2) Check that nobody is in the car
- 3) Deactivate the landing call
- 4) Change the electrical connection as indicated in fig.1 (AnnexA)
- 5) Using the maintenance panel send a landing call
- 6) The NCUM will open the outputs 13-14, 23-24
- 7) The stopping element will be activated
- 8) Measure the braking trip distance

Testing procedure according §5.8.3.2.5

Monitoring test with a working breaking element

- 1) Install all the appropriate out of serving signalling at each floor
- 2) Check that nobody is in the car
- 3) Deactivate the landing call
- 4) Send an impulse to T1 and/or T2
- 5) The NCUM will open the outputs 13-14 and/or 23-24
- 6) The signals R1 and/or R2 will change logical state and if everything works correctly the outputs 13-14 and/or 23-24 will be closed
- 7) Chek the system functionality monitoring the signals as indicated in the figures 4,5,6 (pag. 3 manual)

Monitoring with a simulation of faulty braking element

- 1) Install all the appropriate out of serving signalling at each floor
- 2) Check that nobody is in the car
- 3) Deactivate the landing call
- 4) Shortcircuit the input R1,R2 as indicated fig.2 (Annex A)
- 5) Send an impulse to T1 and/or T2
- 6) The NCUM will open the outputs 13-14 and/or 23-24 that there will be not closed automatically
- 7) Check the system functionality monitoring the signals as indicated in the figures 4,5,6 (pag. 3 manual)

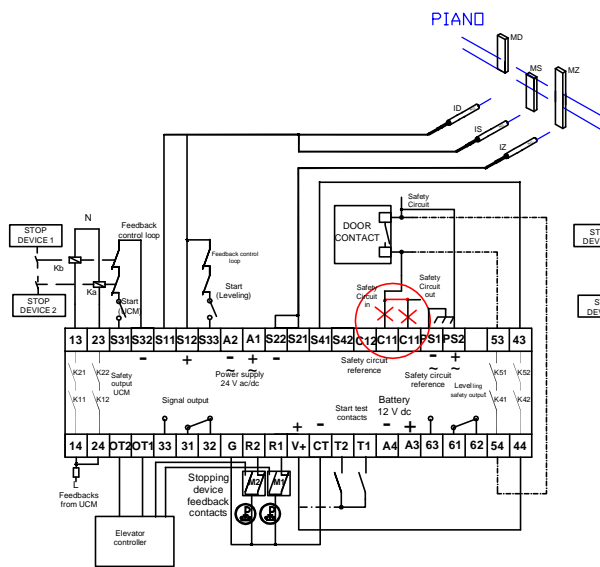


FIG. 1 Uncontrolled movement test

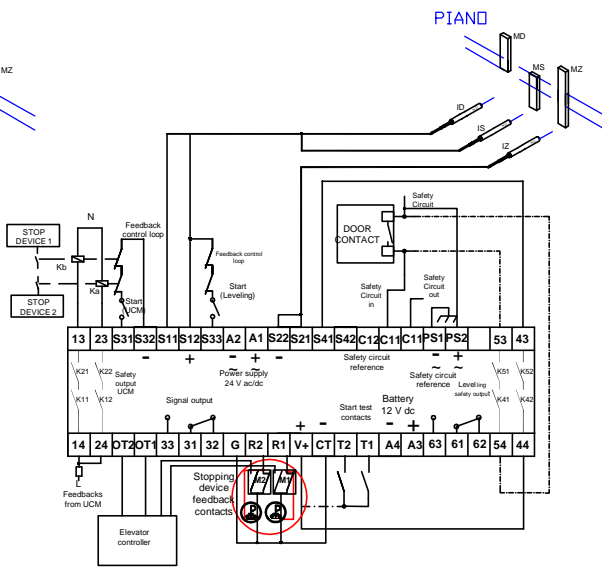


FIG. 2 Fault simulation of the stopping element

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